

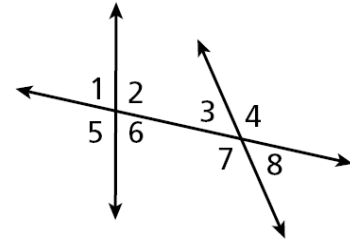
**Attendance Problems. Identify each angle pair.**

1.  $\angle 1$  &  $\angle 3$

2.  $\angle 3$  &  $\angle 6$

3.  $\angle 4$  &  $\angle 5$

4.  $\angle 6$  &  $\angle 7$ .

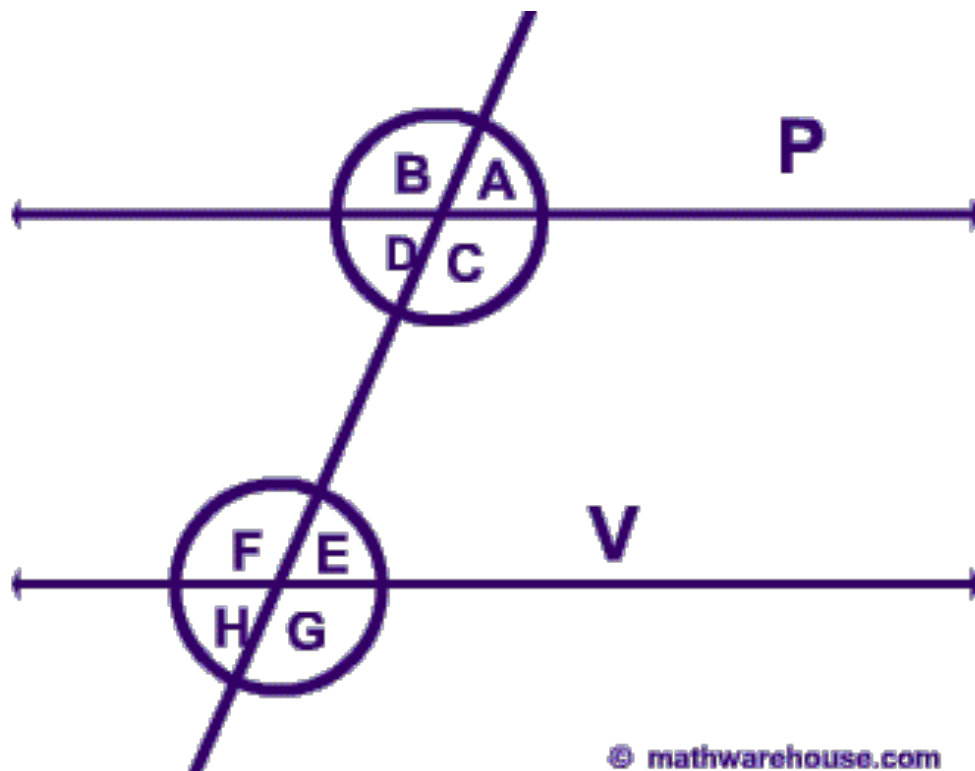


I can prove and use theorems about the angles formed by parallel lines and a transversal.

**Common Core CC.9-12.G.CO.1** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the un-defined notions of point, line, distance along a line, and distance around a circular arc.

**Postulate 3-2-1 Corresponding Angles Postulate**

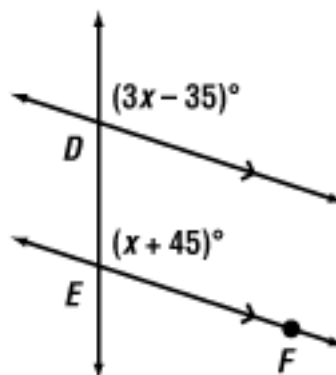
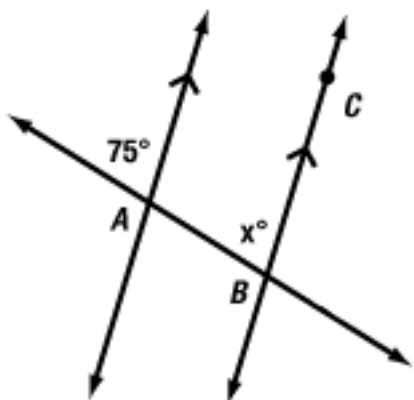
THEOREM	HYPOTHESIS	CONCLUSION
If two parallel lines are cut by a transversal, then the pairs of corresponding angles are congruent.		$\angle 1 \cong \angle 3$ $\angle 2 \cong \angle 4$ $\angle 5 \cong \angle 7$ $\angle 6 \cong \angle 8$



**Video Example 1. Find each angle measure.**

A.  $\angle ABC$ .

B.  $\angle DEF$ .



**EXAMPLE 1 Using the Corresponding Angles Postulate**

Find each angle measure.

**A**  $m\angle ABC$

$$x = 80 \quad \text{Corr. } \angle \text{ Post.}$$

$$m\angle ABC = 80^\circ$$

**B**  $m\angle DEF$

$$(2x - 45)^\circ = (x + 30)^\circ \quad \text{Corr. } \angle \text{ Post.}$$

$$x - 45 = 30$$

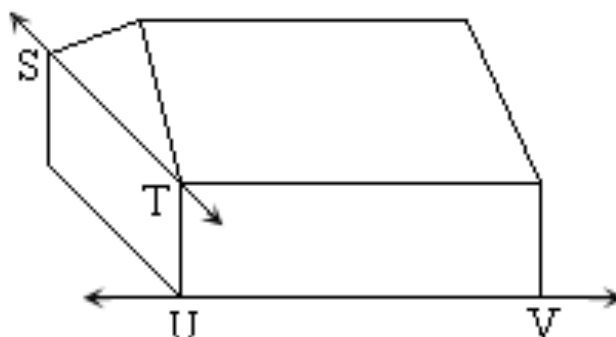
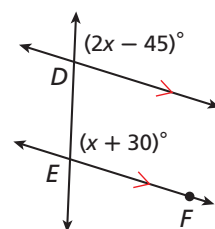
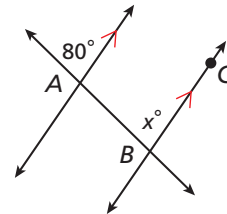
$$x = 75$$

$$m\angle DEF = x + 30$$

$$= 75 + 30 \quad \text{Substitute 75 for } x.$$

$$= 105^\circ$$

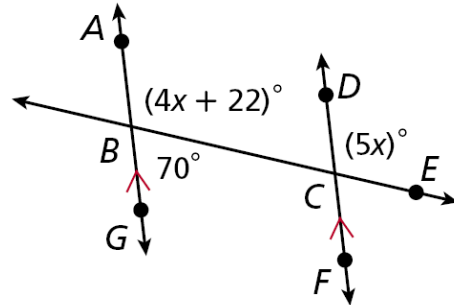
**xy Algebra**



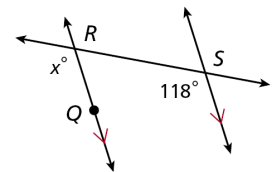
**Example 1.** Find each angle measure.

A.  $m\angle ECF$

B.  $m\angle DCE$



**5. Guided Practice:** Find  $m\angle QRS$ .



**Theorems Parallel Lines and Angle Pairs**

**Helpful Hint**

If a transversal is perpendicular to two parallel lines, all eight angles are congruent.

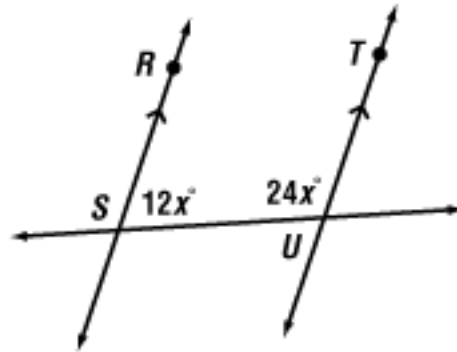
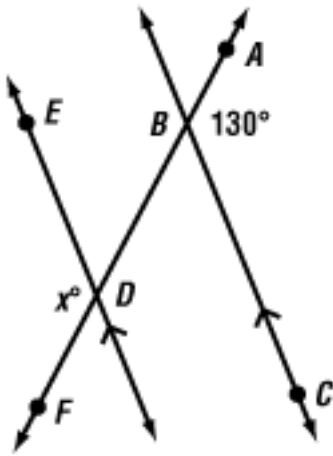
THEOREM	HYPOTHESIS	CONCLUSION
<b>3-2-2 Alternate Interior Angles Theorem</b> If two parallel lines are cut by a transversal, then the pairs of alternate interior angles are congruent.		$\angle 1 \cong \angle 3$ $\angle 2 \cong \angle 4$
<b>3-2-3 Alternate Exterior Angles Theorem</b> If two parallel lines are cut by a transversal, then the two pairs of alternate exterior angles are congruent.		$\angle 5 \cong \angle 7$ $\angle 6 \cong \angle 8$
<b>3-2-4 Same-Side Interior Angles Theorem</b> If two parallel lines are cut by a transversal, then the two pairs of same-side interior angles are supplementary.		$m\angle 1 + m\angle 4 = 180^\circ$ $m\angle 2 + m\angle 3 = 180^\circ$

Remember that postulates are statements that are accepted without proof.

**Video Example 2. Find each angle measure.**

A.  $\angle EDF$

B.  $m\angle TUS$



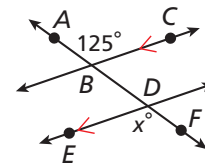
**EXAMPLE 2 Finding Angle Measures**

Find each angle measure.

**A**  $m\angle EDF$

$$x = 125$$

$$m\angle EDF = 125^\circ \quad \text{Alt. Ext. } \angle \text{ Thm.}$$



**B**  $m\angle TUS$

$$13x^\circ + 23x^\circ = 180^\circ$$

$$36x = 180$$

$$x = 5$$

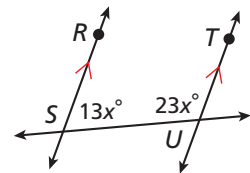
$$m\angle TUS = 23(5) = 115^\circ$$

Same-Side Int.  $\angle$  Thm.

Combine like terms.

Divide both sides by 36.

Substitute 5 for  $x$ .



**xy Algebra**

Home owner: How do I know these two doors are the same size?

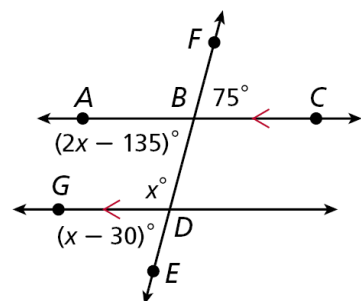
Carpenter: They're alternate exterior doors.

"Elvis is my copilot." -- Cal Keegan

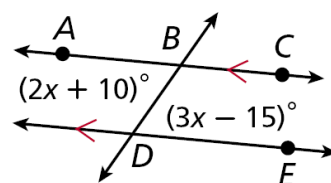
**Example 2.** Find each angle measure.

A.  $m\angle EDG$

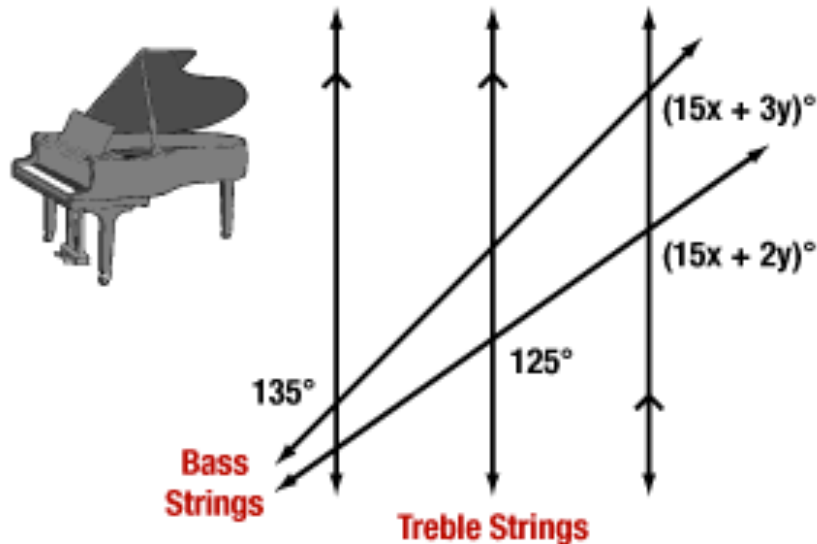
3.  $m\angle BDG$



6. Find  $m\angle ABD$



**Video Example 3.** The treble strings of a grand piano are parallel. Viewed from above, the bass strings form transversals to the treble strings. Find  $x$  and  $y$  in the diagram.



### EXAMPLE 3 Music Application

**x<sup>2</sup>y Algebra**

The treble strings of a grand piano are parallel. Viewed from above, the bass strings form transversals to the treble strings. Find  $x$  and  $y$  in the diagram.

By the Alternate Exterior Angles Theorem,  $(25x + 5y)^\circ = 125^\circ$ .

By the Corresponding Angles Postulate,  $(25x + 4y)^\circ = 120^\circ$ .

$$25x + 5y = 125$$

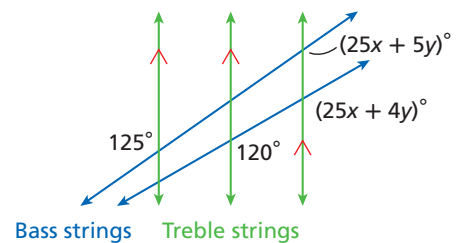
$$\begin{array}{r} 25x + 5y = 125 \\ -(25x + 4y = 120) \\ \hline y = 5 \end{array}$$

$$25x + 5(5) = 125$$

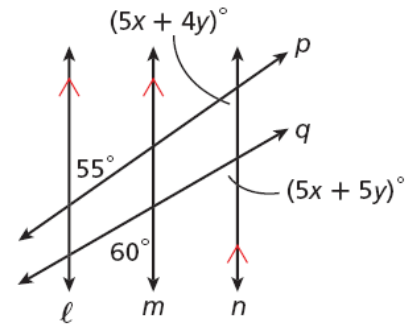
$$x = 4, y = 5$$

*Subtract the second equation from the first equation.*

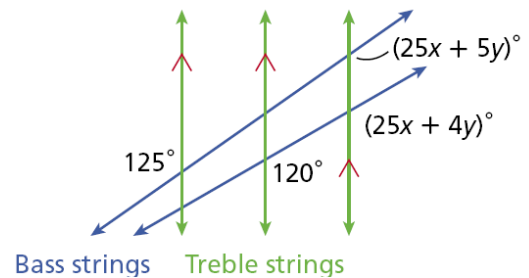
*Substitute 5 for  $y$  in  $25x + 5y = 125$ . Simplify and solve for  $x$ .*



**Example 3.** Find  $x$  and  $y$  in the diagram.



**3.** Find the measures of the acute angles in the diagram.



**3-2 Angles Formed by Parallel Lines** (p 158) 6, 7, 9, 11, 12.

